Protecting the Big Sioux Aquifer

Aquifers are significantly tied to surface waters, making them sensitive and vulnerable to both point and nonpoint source contamination. This is why the East Dakota Water Development District (EDWDD), a regional organization concerned with water issues, spearheaded a movement to learn more about aquifers, their relative sensitivity to contamination, and measures needed to protect them. The Big Sioux Aquifer and other smaller surface aquifers lie under approximately 1,000 square miles of eastern South Dakota. They supply drinking water to about one-third of the state's population.

Although no widespread pollution problem existed, studies had uncovered isolated cases of contamination. Nitrate has contaminated numerous public water supplies, and some 80 cases of methemoglobinemia (blue baby disease) have been documented, with approximately $2.6 million spent to replace or drill new wells to avoid high nitrate levels.

In one study, 30 percent of the private wells tested had bacterial contamination and/or nitrate levels above safe drinking water standards. Clearly, a grassroots effort was needed to protect the aquifers.

The Big Sioux Aquifer Protection Projects goal was to protect the Big Sioux Aquifer and other sensitive shallow aquifers from contamination. Its method was to develop and pass local zoning ordinances to ensure protection.

Before such a project could be effective, an intensive information and education campaign was carried out to inform local organizations--primarily counties and cities--and citizens about the potential problems threatening their water supplies.

To begin the project, EDWDD identified shallow aquifers vulnerable to contamination and located 30 public water supply wells within the project area. It also gathered as much information as possible about the public water supply wells to help delineate a wellhead protection area (WHPA) for each one.

EDWDD developed a model groundwater protection ordinance that allowed city or county zoning authorities to limit the kinds of activities within the WHPA and used it to promote the concept of groundwater protection through regulation. Localities then modified the model ordinance to develop ordinances to - accommodate local conditions. As of August 1993, two cities and nine counties had adopted ordinances, with several more in the process.

BIG SIOUX AQUIFER

Local ordinances protect groundwater by limiting or prohibiting specific activities within the WHPA such as:

- New feedlots and/or manure storage facilities,
- Solid waste storage facilities--dumps and landfills,
- Deicing chemical and road salt storage,
- Car washes--oil, degreasers, and other associated contaminants,
- Open burning,
- Wastewater facilities,
- Waste oil spreading on the land,
- Storage of various hazardous or toxic chemicals such as PCBs,
- Activities associated with internal combustion engines such as auto service/repair stations and junk yards,
- Class V wells, and
- Fall application of fertilizers containing nitrogen.

Since ordinances are not designed to deal with accidents such as hazardous or toxic material spills, the City of Sioux Falls is developing a water supply contingency plan. Other communities have expressed interest in developing similar contingency plans.

To identify and address existing sources of contaminants, EDWDD undertook five additional activities under the project. They were:

- A Class V Injection Well Control Demonstration Project that identified 15 Class V wells (activities that dispose of waste, other than household, through a septic tank) and prepared measures to eventually close those wells;
- An informational video that discussed the Class V injection well issue;
- A Shallow Abandoned Well Sealing Demonstration Project to seal unused wells that could contaminate the underlying aquifer;
- A USDA Big Sioux Aquifer Water Quality Demonstration Project to demonstrate the impact of selected BMPs on water quality of groundwater; and
- A study of feedlot contaminants of shallow aquifers to track the aerial extent and magnitude of groundwater contamination from six feedlots.

Other related area activities included installing 48 monitoring wells within nine WHPAs to provide an early detection system and using the Farm*A*Syst Program to inform landowners in rural areas about threats to their domestic wells.

This protection project has clearly succeeded in limiting or preventing activities that could contaminate groundwater. The variety of activities contained in the project evoked much interest, and the project sponsor was invited to speak at a number of national and regional conferences.